
800 SERIES

***data*mac**

USER MANUAL

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COMPUTER SYSTEMS

• 680 ALMANOR AVENUE

• SUNNYVALE, CA 94086

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USERS MANUAL**

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SECTION 1.0

GENERAL INFORMATION

1.0 INTRODUCTION

If you are a first-time computer user, we welcome you to the creative and constructive world of computers. However, if you are an experienced user, the DATAMAC 800 series computer will still be an exciting experience for you. It exposes you to some of the features of large computers that up to now have been missing from microcomputers -- until the introduction of the DATAMAC 800 series computer.

There are several hardware and software particulars that the first-time user, as well as the experienced user, must be aware of prior to operating the DATAMAC computer.

- 1 - The DATAMAC is designed to operate with the CP/M operating system (CP/M is a registered trademark of Digital Research, Pacific Grove, Ca.). Prior to purchasing application and/or utility programs, the user must insure that the programs will operate in conjunction with the CP/M operating system. Your dealer will have this information available.
- 2 - Application and utility programs may be purchased on either 8" floppy diskettes or 5 1/4" mini-floppy diskettes. Since the DATAMAC computer has two (2) self contained 5 1/4" mini-floppy disk drives, you must obtain your programs on 5 1/4" mini-floppy diskettes.
- 3 - If the programs desired by the user are available only on 8" floppy diskettes, the dealer has the capability to transfer the programs to 5 1/4" mini-floppy diskettes.

NOTE TO THE EXPERIENCED USER

To go directly to your application/utility program(s), load the CP/M operating system as described below.

LOADING PROCEDURE

- Insert the CP/M operating system in disk drive A (lower drive)
- Insure that the disk drive door is closed.
- Depress **CTRL** and **BOOT** simultaneously.
- A successful load will produce the following message on the display screen:

DATAMAC COMPUTER SYSTEMS
MODEL 1800 REVXX SERXXXX
CP/M 2.2 COPYRIGHT (*)
1979 DIGITAL RESEARCH
A>

NOTE TO THE FIRST-TIME USER:

This manual was written and constructed to cover all aspects and functions of the DATAMAC computer for both the first-time user and the experienced user.

There is no way, we at DATAMAC, expect you as a first time user to understand the full contents of this manual at this time. However, the following suggestions should make your first experience with a computer more enjoyable until you become more experienced with your DATAMAC.

- 1 - Please turn to the DEFINITION OF TERMS (Appendix A) in the back of this manual and get acquainted with the terms listed before continuing.
- 2 - In order to operate the computer for most applications, you need only understand sections 1.1, 1.2, 1.3, 2.1, 2.5 (only if you have peripherals) and all of section 3.0.
- 3 - The first hurdle to overcome is FEAR. Become acquainted with the keyboard so you need not fear pushing the wrong button or key that may break the computer. With the DATAMAC computer, the only way to really break it is to drop it on the floor. Always remember that anything entered incorrectly by depressing the wrong button or key can be corrected and/or re-done. Always keep in mind that you are in control and the computer works for you.

1.1 SYSTEM INSPECTION AND TURN ON

Remove the components of your DATAMAC computer from their shipping cartons and place in a convenient place so that you may do a through inspection to ensure there was no damage during shipping.

- Make a visual check of the component housing, screen and keyboard.
- Check to see if you have the following items included with your computer:

- 1 - CP/M Operating System Disk
- 2 - User Manual
- 3 - CP/M Registration Card (if not signed at dealers)
- 4 - Warranteer Card

1.2 POWER ON

- If visual inspection indicates no damage, connect components as shown in Figure 1-1.
- Plug the A.C. line cord into a 110 volt a.c. (or 220 volt if so configured) outlet.
- As you are facing the computer, reach around the left right until your hand is at the rear of the system. You should now be able to feel the ON/OFF switch (Ref. Fig. 1-2). Depress until it moves to the opposite direction.
- Upon applying power, the computer will perform a "self test" of its circuits to insure all are operational. Approximately four (4) seconds after power is applied, a beep will be heard. After the test is complete, the word READY followed by a small flashing rectangular indicator called a CURSOR will appear in the upper left corner of the display screen.

NOTE: If the two displays do not appear, switch the system OFF then ON again. If the display does not appear, the second time, switch the system OFF and contact your dealer.

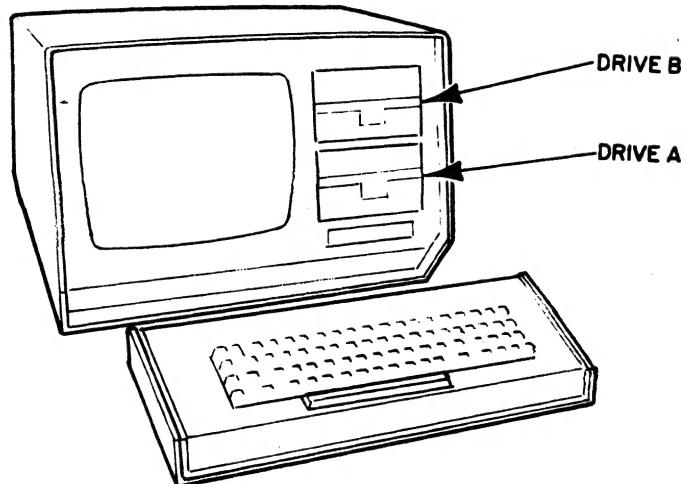


FIGURE 1-1. DATAMAC 800 COMPONENT CONNECTION

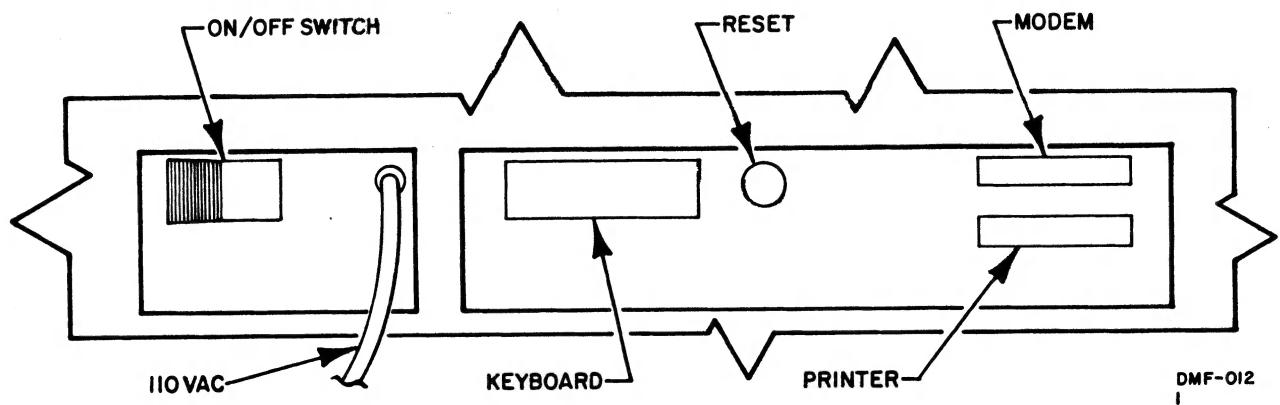


FIGURE 1-2. DATAMAC 800 AS VIEWED FROM THE REAR

1.3 BRIGHTNESS (INTENSITY) CONTROL

The brightness or intensity of the CRT display screen is factory adjusted and has no external adjustment controls. When the system is initially turned on, the screen will be bright; however, after several minutes, the brightness will decrease slightly.

SECTION 2.0

HARDWARE

2.0 INTRODUCTION

This section will discuss the DATAMAC 800 computer standard hardware and a description of available options. Eventhough your system may not be equiped with options, they are included at the end of this section for the benifit of the user who may have them in their system.

2.1 KEYBOARD

The keyboard on the DATAMAC is a very straight forward and simple device to use and is explained in four mechanical sections A, B, C and D. The first time user will not need all of the functions listed below; however, you should be familiar with them for future use.

- Section A - This section is the main body to the keyboard and is similar to the SELECTRIC STYLE TYPEWRITER keys, including the slope and the height of the keyboard housing itself. All keys function the same as a standard typewriter including the lock key which will shift lock the keyboard.

NOTE: The number keys at the top of the keyboard are used the same as a regular typewriter and should not be confused with the Ten Key Pad used in accounting and numbers programs (Ref. Keyboard Section D).

- Section B - This section is the group of four keys on the left of the main body of keys. The **ESC** key will initiate multiple character sequence causing the computer to assign a different meaning to the next stroke that occurs. This allows special functions to occur under control of the executing program. An example of this is the "clear screen" command which is accomplished by depressing the **ESC** key, followed by depressing the **SHIFT** and "*" key followed by **RETURN**. This special sequence of characters will be detected by the DATAMAC terminal emulator and cause the CRT display memory to be cleared to null characters.

The key with an arrow indicating DOWN causes the CURSOR to move one line down until the bottom line has been reached. The display screen will then scroll one line up.

The **ALPHA** key locks the keyboard in an upper case mode for all alpha characters but allows the number keys to be in lower case.

The CTRL (CONTROL) key, similar to the shift key, when depressed at the same time as another key will alter the meaning of the key that is pressed. It allows the keyboard to provide the special signals necessary to perform text editing and other user definable operations.

- o Section C - The column of four keys in section C provide CURSOR control for the built-in terminal. They generate the standard ASCII codes for the four directions of movement.
- o Section D - The upper six keys of section D are used for word processing editors and may be configured to any ASCII key code allowing them to be used with the various editing programs available under CP/M. The remaining six keys are used to operate the SYSTEM ACTIVITY MONITOR (SAM) of the DATAMAC computer. This function is provided for DATAMAC users to aid in the debugging of both existing and new programs. This feature is transparent for normal applications of the DATAMAC system, and will not complicate the operation of the system for any application.

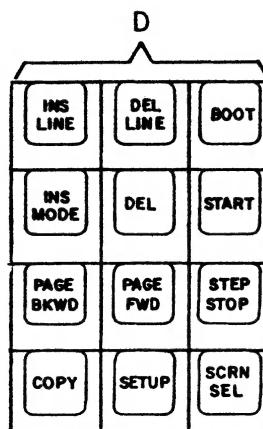
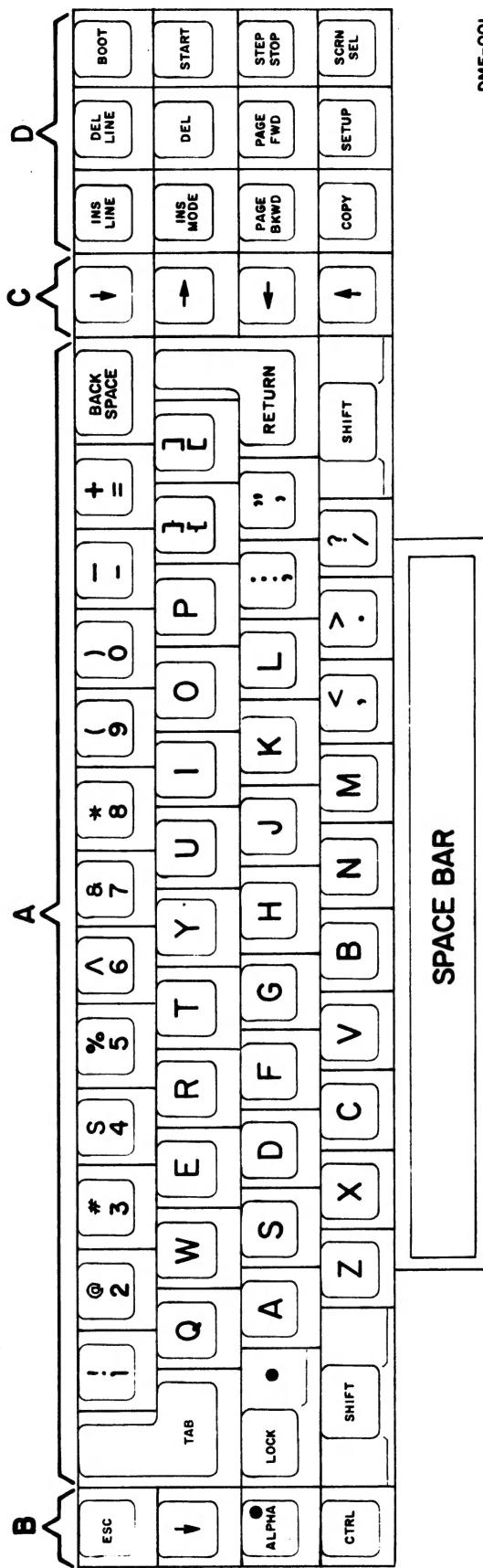


FIGURE 2-1. SECTION D KEYS

NOTE: The alternate use for section D is a 10 key number pad that may be used to input numerical data into the computer. It is identical to using the top row of number keys shown in section A.



DMF-001

FIGURE 2-2. DATAMAC KEYBOARD

2.2 DATAMAC TERMINAL/SYSTEM MODES

The DATAMAC computer is initialized during power on and also when RESET is depressed. The system initially comes on as an asynchronous terminal which may be attached to other computers.

NOTE: The SYSTEM RESET button (Ref. Fig. 1-2) is a small RED button located at the rear of the system.

The configuration of the terminal mode may be modified to adapt to various conditions by changing the characteristics of the terminal emulator. The following characteristics are set at the factory to ensure that the terminal always comes up in the same configuration.

<u>(A)PORT (Modem)</u>	<u>(B)PORT (Printer)</u>
300 Baud	1200 Baud
8 bits per character	8 bits per character
1 stop bit	1 stop bit
No parity	No parity

To convert the DATAMAC computer from a terminal to a computer, it must be loaded with an operating system.

LOADING PROCEDURE:

- Insert the CP/M operating system into disk drive "A" (lower drive). Insure that the disk drive door is closed.
- Depress **CTRL** and **BOOT** keys simultaneously.
- A successful load will produce the following message on the display screen:

```
DATAMAC COMPUTER SYSTEMS
MODEL 1800 REVXX SERXXXX
CP/M 2.2 COPYRIGHT (*)
1979 DIGITAL RESEARCH
A>
```

2.3 TERMINAL EMULATOR

The DATAMAC computer is designed to emulate the SOROC IQ120 terminal using ASCII codes in conjunction with the CONTROL (CTRL) key, ESCAPE (ESC) key and video attributes.

2.3.1 Control Keys

The CONTROL (CTRL) key used simultaneously with the following alpha keys perform the following functions:

- CTRL H = Move the CURSOR backwards one character or space.
(same as the BACK arrow)
- CTRL L = Move the CURSOR forward one character or space.
(same as the FORWARD arrow)
- CTRL K = Move the CURSOR up one line.
(same as the UP arrow)
- CTRL J = Move the CURSOR down one line.
(same as the DOWN arrow)
- CTRL I = Skip or move CURSOR multiple spaces.
(same as TAB key)

2.3.2 Escape (ESC) Key

The ESCAPE (ESC) key utilized in conjunction with the SHIFT key, to select upper-case mode, and the following characters are used by the DATAMAC 800 series as escape functions:

- ESC * = Clear Screen (Decimal 27 and 42)
- ESC Y = Clear to End of Screen (Decimal 27 and 89)
- ESC T = Clear to End of Line (Decimal 27 and 84)
- ESC YX = CURSOR YX addressing with Y being row position and X being the column position.

NOTE:

Reference Appendix B for hex, decimal and ASCII chart.

<u>X/Y</u>	<u>ASCII CODE</u>	<u>X/Y</u>	<u>ASCII CODE</u>
1	SPACE	41	H
2	!	42	I
3	"	43	J
4	#	44	K
5	\$	45	L
6	%	46	M
7	&	47	N
8	-	48	O
9	(49	P
10)	50	Q
11	*	51	R
12	+	52	S
13	,	53	T
14		54	U
15		55	V
16		56	W
17		57	X
18	1	58	Y
19	2	59	Z
20	3	60	[
21	4	61	-
22	5	62]
23	6	63	©
24	7	64	-
25	8	65	a
26	9	66	b
27	:	67	c
28	:	68	d
29	<	69	e
30	=	70	f
31	>	71	g
32	?	72	h
33	@	73	i
34	A	74	j
35	B	75	k
36	C	76	l
37	D	77	m
38	E	78	n
39	F	79	o
40	G	80	

2.3.3 Video Attributes

The DATAMAC has the following attributes available,
HIGHLIGHT, REVERSE VIDEO, BLINKING, UNDERLINE AND BLANK.

	BIT	ASSIGNMENT
	:-- 7	DEFINES THE BYTE AS AN ATTRIBUTE
	: 6	NOT USED
1	: 5	HIGHLIGHT
BYTE --:	4	NOT USED
	: 3	BLINKING
	: 2	BLANKING
	: 1	REVERSE
	:-- 0	UNDERLINE

These attributes may be combined by ORing the bits together to provide a composite byte. The attribute may then be sent to the screen by placing it in a string of three characters with the first two characters being ESC followed by a [.

When an attribute sequence is initiated, the following activities occur:

- The attribute occupies a character location on the screen at the point of the CURSOR location.
- When an attribute is placed on the screen, that attribute remains active until it reaches the end of the line or until another attribute is encountered. When another attribute is encountered in the same line - the first attribute is de-activated and the second one is activated to the end of the line or until another one is encountered.
- When an attribute byte is placed onto the screen, that character location will always be a blank space.
- Whenever the BLANK attribute is used in conjunction with other attributes (within the attribute byte), it will take priority over the others.

To turn on the attributes, via the keyboard for a visual display, perform the following:

- 1 - Depress the **RESET** button.
- 2 - Setup the system to HALF DUPLEX MODE (ref. section 2.4.3).
- 3 - Depress the following keys in sequence:
ESC, **L** and lower case **k**.
- 4 - type in the word **TILT**.

To turn on the attributes, initiate the following sequence:

ESC and **[** followed by the attribute byte

The following chart is an example of all possible combinations of bit selection and OR-ing attributes together to form an attribute byte in one operation.

ATTRIBUTE COMBINATION CHART

:45 : E : 1 : 1 : 0 : 0 : 0 : 1 : 0 : 1 : UL, BA

:46 : F : 1 : 1 : 0 : 0 : 0 : 1 : 1 : 0 : REV, BA

:47 : G : 1 : 1 : 0 : 0 : 0 : 1 : 1 : 1 : UL, REV, BA

:48 : H : 1 : 1 : 0 : 0 : 1 : 0 : 0 : 0 : BI

:49 : I : 1 : 1 : 0 : 0 : 1 : 0 : 0 : 1 : UL, BI

:4A : J : 1 : 1 : 0 : 0 : 1 : 0 : 1 : 0 : REV, BI

:4B : K : 1 : 1 : 0 : 0 : 1 : 0 : 1 : 1 : UL, REV, BI

:4C : L : 1 : 1 : 0 : 0 : 1 : 1 : 0 : 0 : BI, BA

:4D : M : 1 : 1 : 0 : 0 : 1 : 1 : 0 : 1 : UL, BI, BA

:4E : N : 1 : 1 : 0 : 0 : 1 : 1 : 1 : 0 : REV, BA, BI

:4F : O : 1 : 1 : 0 : 0 : 1 : 1 : 1 : 1 : UL, REV, BA, BI

:60 : ' : 1 : 1 : 1 : 0 : 0 : 0 : 0 : 0 : HL

:61 : a : 1 : 1 : 1 : 0 : 0 : 0 : 0 : 1 : UL, HL

:62 : b : 1 : 1 : 1 : 0 : 0 : 0 : 1 : 0 : REV, HL

:63 : c : 1 : 1 : 1 : 0 : 0 : 0 : 1 : 1 : UL, REV, HL

:64 : d : 1 : 1 : 1 : 0 : 0 : 1 : 0 : 0 : BA, HL

:65 : e : 1 : 1 : 1 : 0 : 0 : 1 : 0 : 1 : UL, BA, HL

:66 : f : 1 : 1 : 1 : 0 : 0 : 1 : 1 : 0 : REV, BA, HL

:67 : g : 1 : 1 : 1 : 0 : 0 : 1 : 1 : 1 : UL, REV, BA, HL

:68 : h : 1 : 1 : 1 : 0 : 1 : 0 : 0 : 0 : BI, HL

:69 : i : 1 : 1 : 1 : 0 : 1 : 0 : 0 : 1 : UL, BI, HL

:6A : j : 1 : 1 : 1 : 0 : 1 : 0 : 1 : 0 : REV, BI, HL

:6B : k : 1 : 1 : 1 : 0 : 1 : 0 : 1 : 1 : UL, REV, BI, HL

:6C : l : 1 : 1 : 1 : 0 : 1 : 1 : 0 : 0 : BA, BI, HL

:6D : m : 1 : 1 : 1 : 0 : 1 : 1 : 0 : 1 : UL, BA, BI, HL

:6E : n : 1 : 1 : 1 : 0 : 1 : 1 : 1 : 0 : REV, BA, BI, HL

:6F : o : 1 : 1 : 1 : 0 : 1 : 1 : 1 : 1 : UL, REV, BA, BI, HL

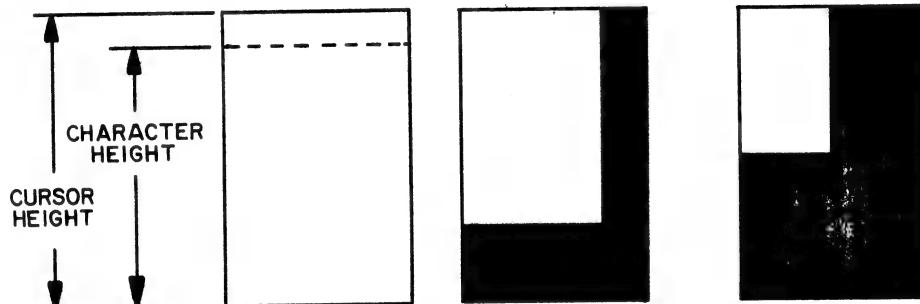
2.3.4 Video Graphics

The DATAMC is designed with graphic capability in order to produce bar charts and computer games to be displayed onto the display screen.

The area for graphic utilization is the same size as the CURSOR which is larger than one character area by approximately two tenths.

There are also two (2) different sets of graphic symbols (ref. attached sheet) which are:

- 1 - Standard BOLD symbols to draw figures and various other types of graphics.
- 2 - Special THIN symbols to draw borders, outlines and thin vertical lines.



To initiate or turn on a graphic sequence from the keyboard, perform the following:

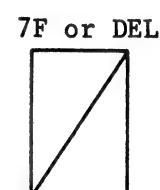
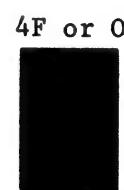
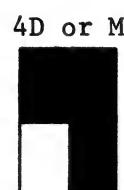
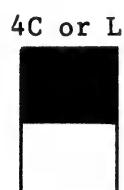
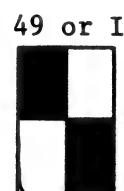
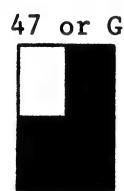
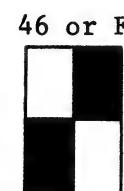
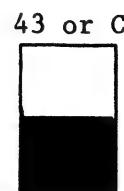
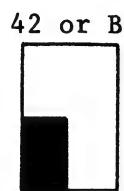
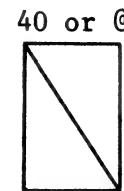
- Using the terminal mode setup keys (ref. sec. 2.4.3) set the computer to HALF DUPLEX MODE.
- Depress the **ESC** (escape) key.
- Depress **SHIFT** and the **>** keys together.

The video graphics have now been turned on.
To turn graphics off from the keyboard - depress **RETURN**

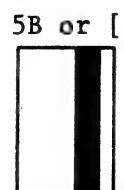
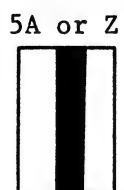
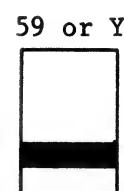
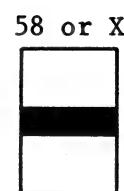
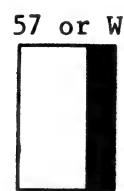
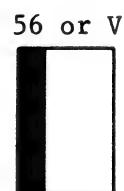
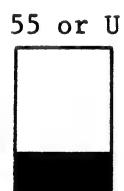
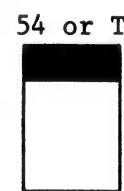
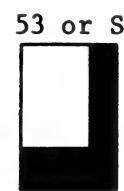
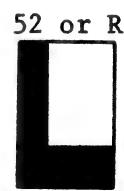
When graphics are under program control, the following sequences are initiated to turn graphics ON/OFF:

ON = ESC (HEX 1B) AND > (HEX 3E)
OFF = ESC (HEX 1B) AND < (HEX 3C)

BOLD SYMBOLS



THIN SYMBOLS



2.4 TERMINAL RECONFIGURATION (SETUP)

The DATAMAC is designed with six (6) options that enables the user to change their characteristics for proper "handshaking" between the host computer and the terminal. These options are TIME, MODEM PORT, DUPLEX MODE, PRINTER PORT, PRINTER ON/OFF and BOOT.

To reconfigure the terminal, depress the **SETUP** key to bring up what we will refer to in this text as "line 25" or the option line. The following will be displayed at the bottom of the display screen.

```
SETUP->A (T)IME (A)PORT (D)UPLEX-HALF (B)PORT (P)RINTER-OFF (L)BOOT->A  
00:00:27 ROW=02 COL=01      A = 300 BAUD--OPTIONS: 11000100 RUN PC = FC35
```

FIGURE 2-3. CONFIGURATION OPTIONS (LINE 25)

NOTE: The characters within the parentheses [i.e. (T)] is the character to be typed in that will arm the option to enable the user to change characteristics.

To change the characteristics of each of the options listed above, perform the following procedures:

2.4.1 (T)TIME

This option is the time that the terminal was either turned on or placed on-line. The internal clock is set up to accept only military time (i.e. 0001 hours or one minute after midnight to 2400 hours or midnight) and will accept only numeric not alpha.

- Type in a **T**. When the T was typed in, the CURSOR moved down to the line directly below line 25. The second line will be called line 26.
- Type in the time you wish to have the clock start counting.
- Depress SETUP to start the clock running.

2.4.2 (A)PORT

The (A)Port option is the same as the MODEM port and allows the user to change the characteristics of the port for "handshaking"

- Type in the letter **A**. When A was typed in, a series of

ones and zeros appeared on line 26. The following chart will aid in determining the proper switches to activate for the required mode:

BIT FORMAT IS 7 6 5 4 3 2 1 0 AS VIEWED ON LINE 26
1 1 0 0 0 1 0 0

BITS 7 6
0 0 = 5 BITS PER CHARACTER
0 1 = 7 BITS PER CHARACTER
1 0 = 6 BITS PER CHARACTER
1 1 = 8 BITS PER CHARACTER

BITS 3 2
0 0 = NOT USED
0 1 = 1 STOP PER CHARACTER
1 0 = 1 1/2 STOP BITS PER CHARACTER
1 1 = 2 STOP BITS PER CHARACTER

BITS 1 0
0 0 = NO PARITY
0 1 = ODD PARITY
1 0 = NO PARITY (SAME AS 00)
1 1 = EVEN PARITY

- To change the BAUD rate (the bit data rate at which data is sent over the serial ports), continue to depress the **A** key until the desired rate (300 baud to 19,200 baud) is obtained. When the desired rate is selected, the depression of the **RETURN** key will move the CURSOR to the right to the first character in the series of ones and zeros.
- To change the first character and then move the CURSOR to the next, type in either a one or a zero. If the character is to remain the same, type that identical character in and then the CURSOR will move to the next. Continue this operation until the last character in the series has been reached.
- To return back to line 25 (or the option line) depress **SETUP** key.

2.4.3 (D) DUPLEX MODE

The DATAMAC terminal is configured in the HALF mode and to change to FULL duplex, type in a **D**. To change back to HALF duplex, type in another **D**.

2.4.4 (B) PORT (Printer) Same as 2.4.2

2.4.5 (P)PRINTER-OFF/ON

The PRINTER-OFF/ON option when turned on allows all characters entered via keyboard to the MODEM port (A PORT) to also be sent over to the PRINTER port (B PORT). This configuration will allow the user to obtain a hardcopy of all characters sent by computer. To change this option from OFF to ON, type in the letter **P**. To change back to OFF type in another **P**.

2.4.6 (L)BOOT->A

This option allows the user to change or select the device from which to BOOT the system (i.e. Disk Drive A,B,C or D). The terminal is brought up with disk drive "A" selected for BOOTING. To change the option to a different configuration, depress the **L** key and the >A will change to >B. A second depression of **L** will change >B to >C. The option character will continue to change from A to D and back to A again as long as the L key is depressed.

2.5 PERIPHERAL ATTACHMENT

The DATAMAC computer is designed to accommodate a variety of peripheral devices such as printer, modem, 8 inch floppy disk and various sizes of hard disk.

2.5.1 Printer Attachment

The DATAMAC computer will accept the attachment of any type of serial printer equipped with an RS232 interface. Attachment is made via Port B which is also equipped with an RS-232 interface with a baud rate handling ability from 300 baud to 19,200 baud.

Interface or "handshaking" signals are provided by the computer at Port B and on the designated connector pins shown in figure 2-4.

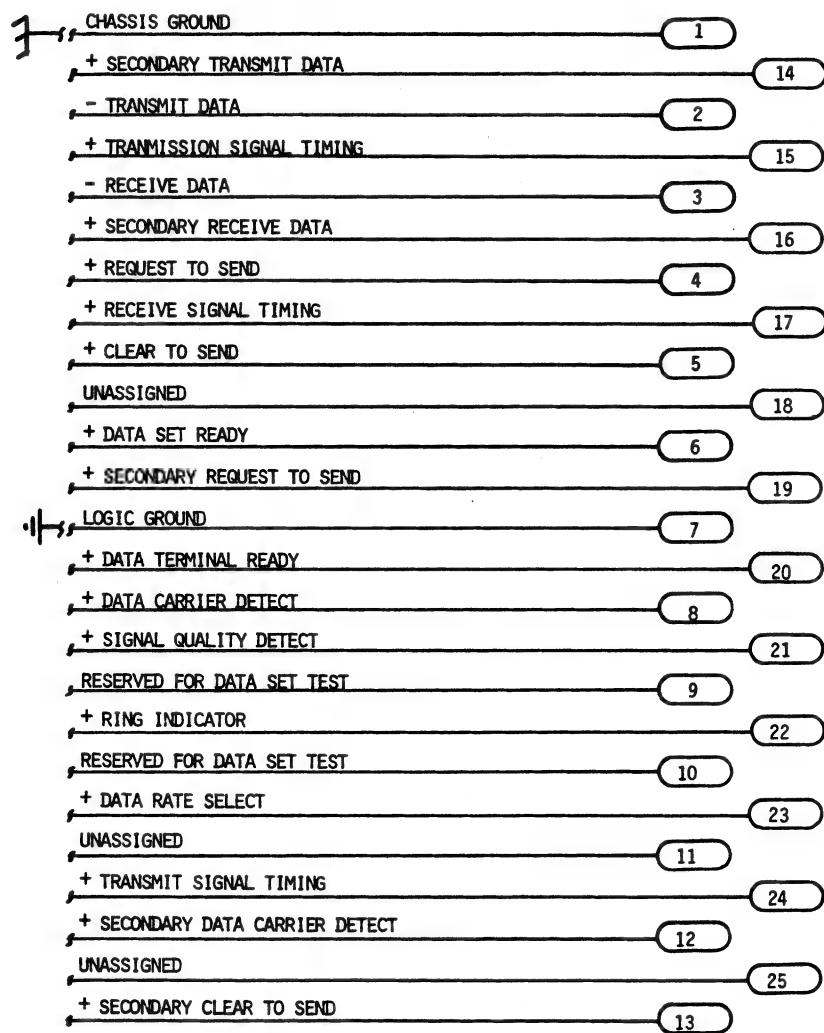


FIGURE 2-4. PRINTER CONNECTOR PIN DESIGNATION

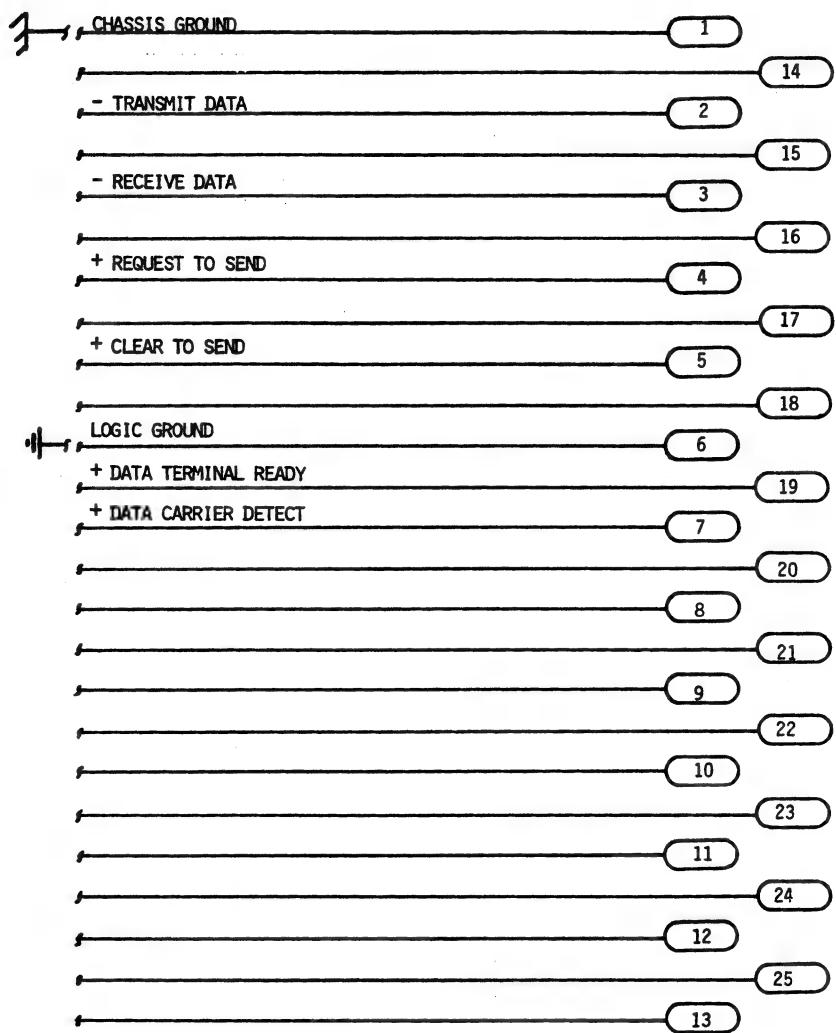


FIGURE 2-5. MODEM CONNECTOR PIN DESIGNATION

2.5.2 Modem Attachment

Modem attachment is made via Port A utilizing a standard RS232 interface connector. The DATAMAC computer is capable of transmitting and receiving data at baud rates from 300 baud to 19,200 baud.

For interface or "handshaking" signals and their designated connector pin callouts, reference figure 2-5.

2.5.3 8 Inch Floppy Disk Drive Attachment

A maximum of two (2) 8" floppy disks may be "daisy" chained to the DATAMAC computer in conjunction with the two (2) built-in 5 1/4" mini-floppy disk drives.

- DRIVE ADDRESSING - The two built-in drives are designated as Drive A (lower drive) and Drive B (upper drive) and the two external 8" drives are designated Drive C and Drive D.

Drive addressing is accomplished by adding jumpers (supplied with each 8" drive) directly to the drives printed circuit board.

NOTE: All external drives must be jumpered so that power is supplied to the stepping motor at all times.

JUMPER LIST FOR SHUGART 800/801 DRIVES

- 1- X - open
- 2- DC - open
- 3- D - open
- 4- C - jumper
- 5- I - trace intact
- 6- R - trace intact
- 7- S - trace intact
- 8- DS,3,4 - select appropriate drive address
- 9- T1,2,3,4,5, and 6 - jumpered on last drive in system
- 10- HL - open
- 11- DS - open
- 12- RI - trace intact
- 13- RR - trace intact
- 14- Y - open
- 15- Z - jumper
- 16- 800 - jumper
- 17- 801 - open
- 18- A - jumper
- 19- B - jumper

- DRIVE TERMINATION - The last drive in the chain must be terminated by adding jumpers to the printed circuit to jumper in the terminating resistors affixed to the board.

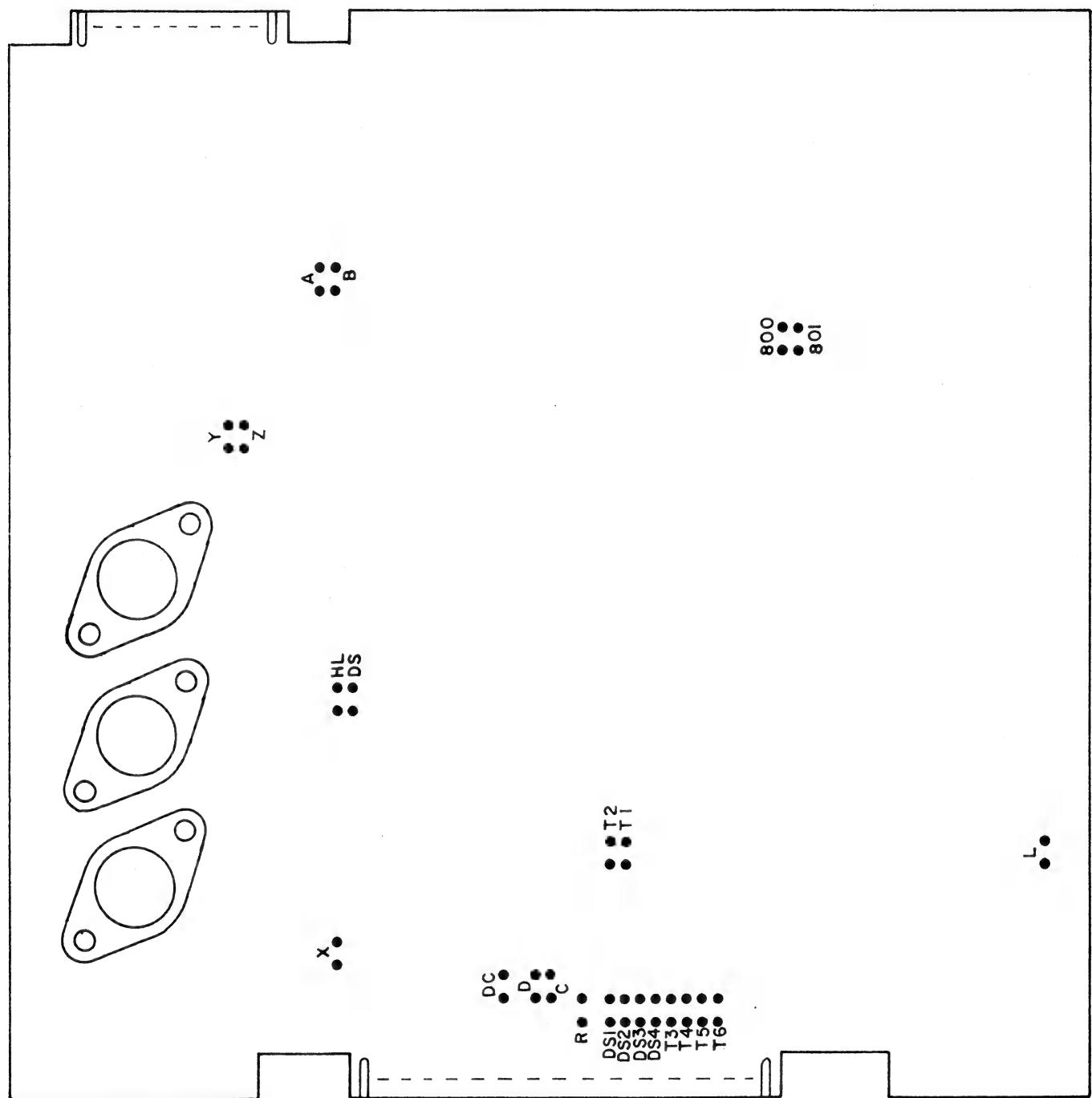


FIGURE 2-6. JUMPER PIN LOCATION

NOTE: If the 8" disk drives are powered down with the resistors jumpered in for termination, the signal lines of the built-in 5 1/4" floppy disk will be pulled down causing disk errors.

Before using the DATAMAC with 8" disk drives turned off, the cables between the DATAMAC and the 8" drives must be removed.

2.5.4 Hard Disk Attachment

For hard disk attachment, contact DATAMAC factory.

2.6 REMOTE DIAGNOSTICS FEATURE

The REMOTE DIAGNOSTICS feature, used with 52k systems only, enables the user to communicate directly with another DATAMAC computer via either a serial RS232 keyboard or modem. This feature is utilized to help you troubleshoot your system in the event of malfunctions or to help in debugging your programs.

In order to utilize REMOTE DIAGNOSTICS, your CP/M operating system must contain the DIAGSON program to set-up the appropriate hooks and handshaking signals. This program is a security function of this feature which inhibits remote entry into your system until it is activated by you.

You must also construct a three (3) wire cable with RS232, "D" type connectors on either end (Ref. Figure 2-8). This is a special signal cable to be connected between the serial printer port (Port B) and modem.

When you initially turn on your system, it comes up in the Terminal mode and automatically enables the REMOTE DIAGNOSTICS feature and will stay activated until the **CTRL/BOOT** keys are depressed to BOOT your system. In the Terminal mode your DATAMAC can communicate with another DATAMAC to perform REMOTE DIAGNOSTICS. To run REMOTE DIAGNOSTICS, in the system mode, perform the following procedure.

PROCEDURE:

- Connect the three wire special cable between the printer port (serial Port B) and modem.
- Turn on your system.
- Dial up, via phone and modem, remote DATAMAC. (At this point, REMOTE DIAGNOSTICS can be performed on the Terminal portion of your system only, not the computer)

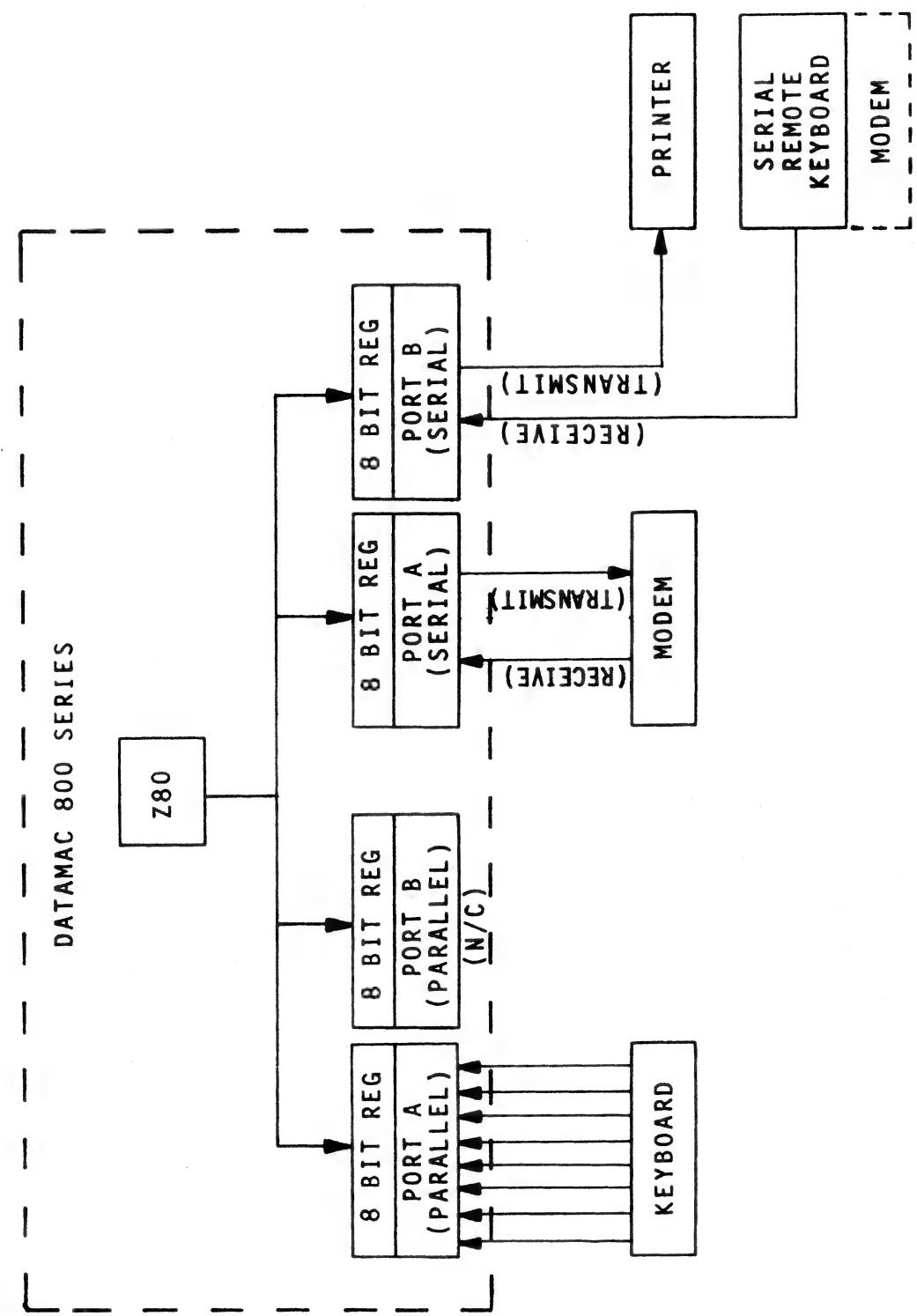


FIGURE 2-7. REFERENCE DRAWING - REMOTE DIAGNOSTICS

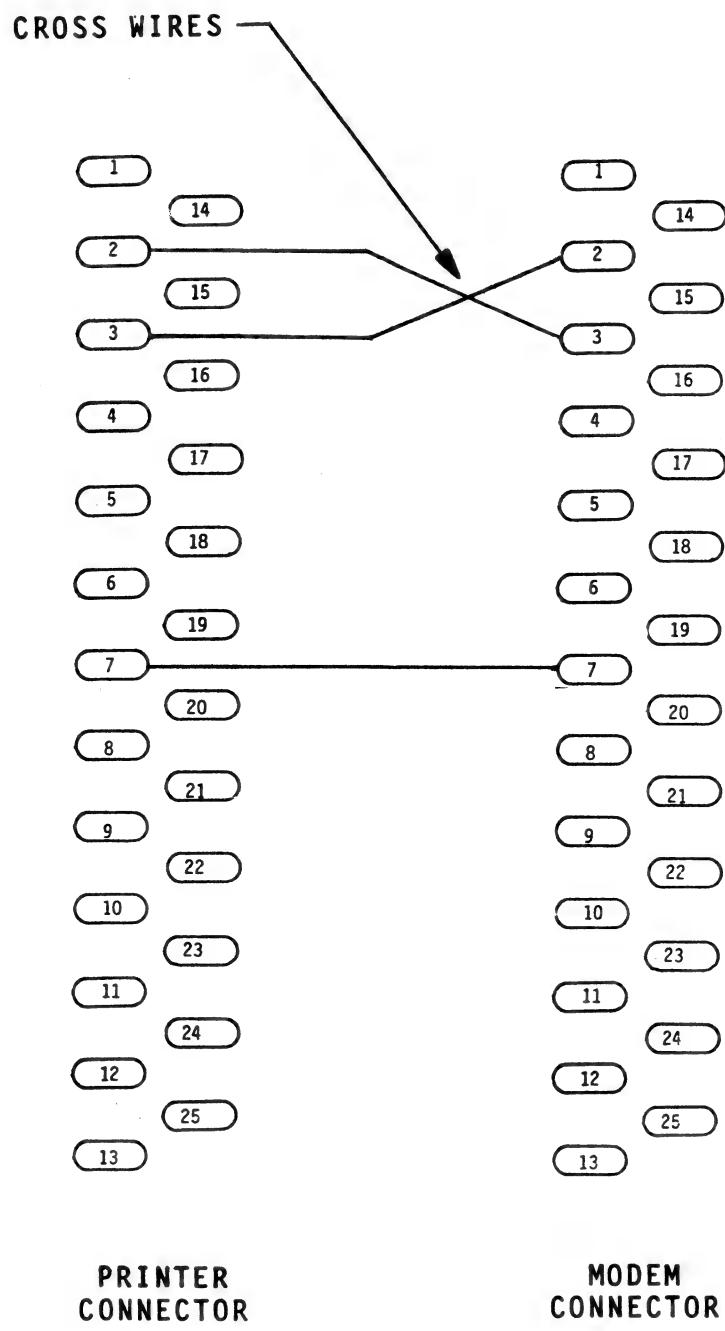


FIGURE 2-8. SPECIAL THREE WIRE CABLE CONNECTIONS

NOTE:

To perform REMOTE DIAGNOSTICS on your computer continue on to the following steps.

- When given instructions from the remote DATAMAC, type in the following program:

DIAGSON.COM -- depress **RETURN.**

At this point, the remote computer will take over your system and run the appropriate diagnostics.

2.7 AUTO CONFIGURATION ALTERATION

TERMINAL RECONFIGURATION (SETUP) was discussed in section 2.4 explaining that the system comes up with its "handshaking" characteristics set to pre-designated values and that they can be changed at any time via the keyboard.

The DATAMAC also gives you the ability to change these characteristics automatically, via a routine on your operating disk, so that every time the system is booted, all of the preset characteristics are automatically changed for your particular application.

The CONFIG.COM routine, contained on your CP/M operating system will allow you to automatically alter the characteristics for each disk. However, you still have the ability to manually change any or all of the characteristics throughout the operation by utilizing the Terminal Setup procedure in section 2.4.

To utilize the AUTO CONFIGURATION ALTERATION feature, perform the following procedure:

PROCEDURE:

- Load your CP/M operating system.
- Type in **CONFIG** -- depress **RETURN.**
- The following message will appear on your screen:

THE PURPOSE OF THIS UTILITY IS TO DEFINE THE DATAMAC 800 FEATURES AT BOOT TIME. YOU MUST USE A 52K STANDARD SYSTEM DISK FOR THE EDIT PORTION. IF YOU HAVE ONLY A 58K SYSTEM DISK THEN FOLLOW THE PROCEDURE BELOW:

1. BOOT THE 58K SYSTEM DISK
2. TYPE <REN XOOT58K.COM=BOOT58K.COM>
3. HARDWARE SYSTEM RESET
4. REBOOT YOUR SYSTEM
5. TYPE <CONFIG14>
6. COMPLETE YOUR SYSTEM CONFIGURATION INCLUDING THE SAVE OPTION
7. AFTER THE SYSTEM GIVES YOU THE A> PROMPT
8. TYPE <REN BOOT58K.COM=XOOT58K.COM>

THE SYSTEM IS NOW READY FOR USE AS A CONFIGURED 58K SYSTEM

THE CURRENT SYSTEM IS 52K ..ENTER ANY CHARACTER TO PROCEED

- If you do not have a 58k system, enter any character and the following message will appear on the screen:

DATAMAC 800 CONFIGURATION UTILITY REV 13

READ CONFIGURATION DATA FROM DISKETTE ?
<Y> WILL USE CURRENT CONFIGURATION DATA IF IT EXISTS ON DISK
<N> WILL USE THE DEFAULT DATA FROM PROGRAM.

ENTER..<Y OR N>

DEFAULT OPTIONS ARE AS FOLLOWS:

- Type in either a **[Y]** or **[N]**-- depress **RETURN**

The following message will appear on the screen:

MODEM PORT = 300 BAUD

1 = 300 BAUD
2 = 600 BAUD
3 = 1200 BAUD
4 = 2400 BAUD
5 = 4800 BAUD
6 = 9600 BAUD
7 = 19200 BAUD

ENTER RATE 1-7 ,C TO CONTINUE OR X TO EXIT

- Select desired BAUD rate -- the following message will appear on your screen:

NOTE:

You do not have to step completely through the routine once you have changed the desired characteristic(s). The depression of **X** to EXIT will send you to the last statement in the routine - bypassing all other selections.

THE MODEM PORT CHARACTER LENGTH

1 = 5 BITS PER CHARACTER
2 = 6 BITS PER CHARACTER
3 = 7 BITS PER CHARACTER
4 = 8 BITS PER CHARACTER

ENTER CHOICE 1-4 ,C TO CONTINUE,OR X TO EXIT

- Select the desired CHARACTER LENGTH -- the following message will appear on your screen:

MODEM PORT STOP BITS

1 = 1 STOP BIT
2 = 1 1/2 STOP BITS
3 = 2 STOP BITS

ENTER 1-3, C TO CONTINUE, OR X TO EXIT

- Type in the desired STOP BIT -- the following message will appear on your screen:

MODEM PARITY IS NO PARITY

1 = NO PARITY
2 = ODD PARITY
3 = EVEN PARITY

ENTER 1-3, C TO CONTINUE, OR X TO EXIT

- Select the desired PARITY -- the following message will appear on your screen:

PRINTER PORT = 1200 BAUD

1 = 300 BAUD
2 = 600 BAUD
3 = 1200 BAUD
4 = 2400 BAUD
5 = 4800 BAUD
6 = 9600 BAUD
7 = 19200 BAUD

ENTER RATE 1-7 ,C TO CONTINUE OR X TO EXIT

- Select the desired BAUD -- the following message will appear on your screen:

THE PRINTER PORT CHARACTER LENGTH = 8 BITS

1 = 5 BITS PER CHARACTER
2 = 6 BITS PER CHARACTER
3 = 7 BITS PER CHARACTER
4 = 8 BITS PER CHARACTER

ENTER CHOICE 1-4 ,C TO CONTINUE,OR X TO EXIT

- Select the desired CHARACTER LENGTH -- the following message will appear on your screen:

PRINTER PORT STOP BIT

1 = 1 STOP BIT
2 = 1 1/2 STOP BITS
3 = 2 STOP BITS

ENTER 1-3, C TO CONTINUE, OR X TO EXIT

- Select the desired STOP BIT -- the following message will appear on your screen:

PRINTER PORT IS NO PARITY

1 = NO PARITY
2 = ODD PARITY
3 = EVEN PARITY

ENTER 1-3, C TO CONTINUE, OR X TO EXIT

- Select the desired PARITY -- the following message will appear on your screen:

LINE25 AND LINE26 ARE SET TO UNDERLINE

1 = UNDERLINE
2 = REVERSE VIDEO
3 = BLANK (INVISIBLE)

ENTER 1-3, C TO CONTINUE OR X TO EXIT

- Select the desired characteristic -- the following message will appear on your screen:

THE CURRENT TURNKEY COMMAND IN BUFFER IS : *** NONE ***
ENTER C TO EDIT THE COMMAND OR X TO EXIT

* CAUTION *

Caution must be exercised when entering a TURNKEY COMMAND. This command will take you directly to the area of your program that you selected (i.e. DIR will display the complete directory of the disk) when you BOOT the system. If you make the TURNKEY COMMAND the name of your application program the system will go DIRECTLY to that point. This means that if you have other programs on the same disk, you will not be able to get to them due to the prompt A> never appearing. If the preceding occurs, perform the following steps:

- 1 - Place disk with TURNKEY COMMAND to be replaced or removed into disk drive B.
- 2 - Place CP/M operating system into disk drive A.
- 3 - Type in **SYSMAC** -- depress **RETURN**.
(Ref. Section 3.4 - "SYSGEN" routine)

You can now put a new TURNKEY COMMAND onto the disk in disk drive B.

- Type in COMMAND (up to eight (8) characters) -- depress **RETURN**.

NOTE:

To remove a COMMAND type all blanks. To change a COMMAND, type in the new COMMAND including blanks if the preceding COMMAND was more characters than the new COMMAND.

- The following message will appear on your screen:

SAVE ON DISK ? Y OR N

- Select either a **Y** or **N** -- the system will now take you back to the prompt A>.

2.8 SYSTEM ACTIVITY MONITOR (SAM) (OPTIONAL FEATURE)

The System Activity Monitor is an optional feature of the DATAMAC. It is designed to aid the user in many ways, such as problem determination during program development and maintenance of hardware environment.

The **STEP/STOP** key will pause the Z80 processor and stop the DATAMAC. Disk I/O operation will be complete. The run indicator which is located next to the PC (PROGRAM COUNTER), will be replaced by the STOP indicator. This means that the DATAMAC 1600 may now be stepped one instruction at a time by depressing the **STEP/STOP** key once for each instruction that the user wishes to execute. The DATAMAC internal operations may be observed by pressing the **SCRN SEL** key which will display the SAM frame. The user may return to the PROGRAM screen by depressing the **SCRN SEL** key again.

Depressing the **SCRN SEL** key will only cause the SAM screen to display but will not contain meaningful information until the **STOP** key is depressed.

The two keys marked **PAGE FWD** and **PAGE BKWD** allows you to either move the SAM screen one page forward or one page backwards upon each depression of the key. Continuous paging, either forward or backward, can be accomplished by depressing either key and holding it down until the system pages completely thru memory.

The following information is contained on the SAM screen:

- One 256 byte page of actual memory starting at the address of the program counter of the Z80 CPU when the **STOP** key was recognized by the system.
- The Z80 primary and alternate registers.
- The memory byte as referenced by the HL and HL' registers.
- The Top of Stack as referenced by the stack pointer.
- The floppy disk command information which is dynamically updated as the information is sent to the controller. The floppy disk result information is also displayed at the same time.
- The BREAKPOINT function and address register allows the user to stop the DATAMAC on a successful comparison of the address bus of the DATAMAC with the breakpoint address register and one of the following events:

OPTION FIELD												RUN PC = FC37											
BREAKPOINT DISPLAY												OPTION											
												IF=57 RD=D7 WR=E7						OPTION					
												FN-ADDR IOWR=BE IORD=BD DMWR=E9 DMRD=DA						OPTION					
												00 EFDF						OPTION					
FLOPPY DISK												FDCMD 46 04 03 01 0A 02 0A 0B FF						OPTION					
REGISTERS												FDRES 04 00 00 04 01 01 02 02						OPTION					
ROW=08 COL=61												M' 00						OPTION					
01:10:06												M DB						OPTION					
I F8 R B8 EI = 1												H E X D A T A						OPTION					
AF 00 54 IX BF FF AF, FF FF BC, FF FF DE, FD FF HL, FF FF												M' 00						OPTION					
BC 00 43 IY FF FF SP CF EC PC 35 TOS DB 77												HEX						OPTION					
DE 0E 3E												M' 00						OPTION					
HL FC 35												HEX						OPTION					
M DB												HEX						OPTION					
01:10:06												HEX						OPTION					
FAD0 B7 FB FE OA CA 78 FB FE 08 CA CE FB FE 07 CA F9 FB C3 C2 FA												HEX						OPTION					
FAE0 FB FE 08 CA CE FB FE 07 CA F9 FB C3 C2 FA												HEX						OPTION					
FAFO FE 07 CA F9 FB C3 C2 FA												HEX						OPTION					
FB00 07 DA 0B FB 07 DA 5D FB C3 6B FB AF 32 13 CF 79												HEX						OPTION					
FB10 FE 3D CA 55 FB FE 59 CA 27 FB FE 54 CA 3F FB FE												HEX						OPTION					
FB20 2A CA A8 FB C3 C2 FA CD 43 F8 3A FE DF 47 3A FD												HEX						OPTION					
FB30 DF CD 4B FB 04 78 FE 19 CA C2 FA AF C3 31 FB CD												HEX						OPTION					

FIGURE 2-9. SYSTEM ACTIVITY MONITOR (SAM)

- 1 - Instruction Fetch
- 2 - Memory Read
- 3 - Memory Write
- 4 - I/O Read (Device Address)
- 5 - I/O Write (Device Address)
- 6 - DMA Read (DMA = Direct Memory Access)
- 7 - DMA Write

2.8.1 How To Display Or Alter Memory Contents Using the Sam

- Depress **SCRN SEL** to display the System Activity Monitor screen.
- Depress **STOP** to update the display. The CURSOR will now be positioned by the SAM to be on the next instruction to be executed.
- Depress **ESC** key.
 - 1 - The CURSOR will now move to the starting memory address field.
 - 2 - Enter the desired address to display and depress the **RETURN** key. The CURSOR will now move to the data area.
 - 3 - Enter the desired data. (NOTE: The new data is now highlighted but will not be modified in real memory until the **RETURN** key is depressed.)
 - 4 - If an error was made in entering data, depressing **ESC** will delete the highlight and re-display the original contents of memory.

2.8.2 How To Display Or Alter Registers

The ability to alter REGISTERS is one of the most effective programming aids available to the user. By altering the registers, the user is able to save time by going into the program and shortening counter loops and modifying particular registers to alter the program control.

PROCEDURE:

- Depress the **SCRN SEL** key to display the SAM screen.
- Depress **STOP** - to stop the processor.
- Depress the **ESC** key once - places the user in the address field.
- Depress **ESC** a second time to position the CURSOR in the OPTION field which will be highlighted.

- Depress the **R** key - CURSOR now moves over to the PROGRAM COUNTER portion of the SAM screen:
 - REGISTERS may now be altered by keying in the appropriate value after re-positioning the CURSOR.
 - As a value is entered into any REGISTER, the entry will be highlighted.
 - The highlighted area indicates the area or character to be changed.
 - The value has not yet been entered into the REGISTER - the depression of **RETURN** will actually enter the information.
 - Upon depression of **RETURN**, the CURSOR returns to the OPTION portion of the SAM screen.
- To alter more than one REGISTER:
 - Depress the **R** key to get into the REGISTER portion of the SAM screen.
 - Use the CURSOR control arrows to move from REGISTER to REGISTER.
 - Enter the desired values. All changes will remain highlighted until **RETURN** is depressed. At this point all REGISTERS are changed to the values entered.
- To continue running a program:
 - When **RETURN** was depressed, the CURSOR returned to the OPTION field.
 - You can depress **SCRN SEL** key - returns back to the PROGRAM SCREEN.
 - In any case, you may depress the **START** key. The program will continue to run or depress the **STEP** key to step thru the program.

2.8.3 How To Use The Breakpoint Feature

The BREAKPOINT feature gives the user the ability to interrupt program processing whenever a prescribed function occurs. The BREAKPOINT has the ability to stop the following functions:

- INSTRUCTION FETCH
- MEMORY READS and WRITES from the processor.
- I/O READ or WRITE addresses
- DIRECT MEMORY ACCESS read or write.

PROCEDURE:

- Depress **SCRN SEL** to display the SAM screen.
- Depress **STOP** to halt processing.
- Depress **ESC** key twice to enter OPTION FIELD (will be highlighted).
- Depress the **B** key for the BREAKPOINT portion of the SAM screen of function field.
- Key in the number **57**. The CURSOR will move down and the 57 will be highlighted. (57 will interrupt processing on an instruction fetch.)
- Enter the desired address to stop on.
- Depress **RETURN**. The BREAKPOINT is now set.
- To re-start the program:

Depress the **START** key. The program will run until it reaches the address set by the BREAKPOINT. The SAM screen may now be examined.

NOTE: Once the BREAKPOINT has been set, it remains set until disabled.

- To disable the BREAKPOINT:
 - 1 - Return to OPTION FIELD by depressing the **ESC** key.
 - 2 - Depress the **B** key for BREAKPOINT.
 - 3 - Key in **00** into the BREAKPOINT function (replaces 57). This operation turns the BREAKPOINT function OFF.
 - 4 - Depress **RETURN** to return to the program.

2.8.4 Floppy Disk Display

The DATAMAC uses a 765 floppy disk controller to read and write to and from the floppy disk.

In order to perform operation with this controller, it is necessary to send a string of command bytes to the controller after every operation be it a seek, read or write. A string of result status bytes are received back from the controller. The bytes sent back by the controller are displayed on the SAM screen in the FLOPPY DISK FIELD.

In the event a floppy disk malfunctions, it is possible to refer to the COMMAND STRING (FD CMD) and the RESULT STRING (FD RES) to determine the status and nature of the floppy disk error that occurred.

To obtain further information for interpreting the COMMAND STRING (FD CMD) and the RESULT STRING (FD RES), refer to either the NEC 765 or INTEL 8272 manuals.

2.8.5 To Print Display Screen

The DATAMAC allows the user to obtain a hardcopy print out of the information on the display screen when the computer is in either the READY or the STOP mode. The COPY key (located in the bottom left corner of section D on the keyboard) is utilized for this function.

The user must insure that the BAUD rate of the computer is the same as that of the printer (Ref. Sec. 2.4.4) prior to depressing the COPY key.

SECTION 3.0

SOFTWARE

3.0 INTRODUCTION

The definition of software is "the totality of programs and routines used to extend the capabilities of a computer". The DATAMAC 1255 is equipped with a CP/M operating system (CP/M is a registered trademark of Digital Research, Pacific Grove, Ca.) which allows the user to run application programs such as word processing, accounting, bookkeeping and many others.

3.1 LOADING THE OPERATING SYSTEM

In order to converse with the computer, you must first load the CP/M system into the computer's memory so that it will have some intelligence. To perform this operation, you must first insert the CP/M disk into drive A with extreme caution not to damage the disk. Always adhere to the following rules when inserting disk:

- DO NOT force diskette into drive opening. Using a gentle movement, insert diskette, with label up, until a soft "click" is heard - then close the door.
- DO NOT write on the diskette with a ball point pen or pencil -- use a felt or flow pen. A ball point pen will make indentations on the surface of the disk causing read/write errors.
- DO NOT let fingers or any foreign material come in contact with the disk surface.
- Store diskettes in the protective envelope and avoid bending the diskette or exposing it to foreign materials such as dust, coffee or other contaminates which may be in the area of the computer.
- Avoid storing diskettes where they are exposed to intense heat or cold.
- Avoid MAGNETIC FIELDS of any form as they may erase the information on the diskettes.

The first time user should be aware of certain standard practices or rules that are followed when using new software and new disk or diskettes for the first time.

- 1 - Place a "write protect" tab on the master CP/M operating system diskette. The "write protect" tab will not allow the computer to write on the master. (Ref. Fig. 3-1)

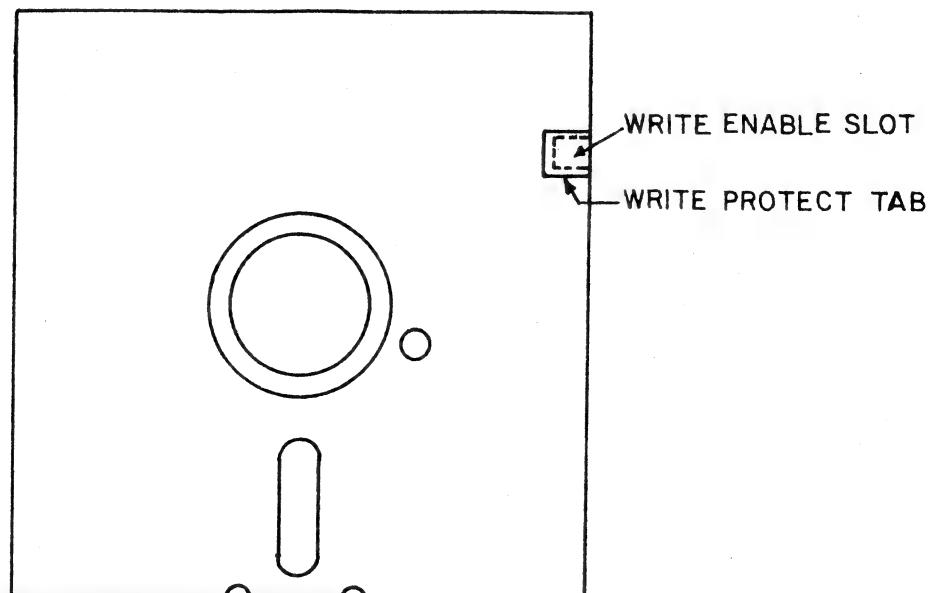


FIGURE 3-1. WRITE PROTECT TAB

- 2 - Initialize or format all new or blank diskettes or disk prior to using. (Ref. Sec. 3.3)

CAUTION

NEVER FORMAT DISKETTES WITH PROGRAMS OR FILES
ALREADY WRITTEN UNLESS YOU ARE CERTAIN YOU
WILL NOT NEED THEM AGAIN.

- 3 - Copy the master CP/M operating system onto all formatted diskettes. (Ref. Sec. 3.4)
- 4 - Make two (2) copies of your operating system and all other software prior to using. (Ref. Sec. 3.7)

3.2 BOOTING OR LOADING THE SYSTEM

At this point, a new word of computer language must be learned. It is called BOOTING or LOADING the system. Both of these words mean the same and you must learn their definition.

(Insure that you still have your CP/M disk loaded in drive A)

Locate the two keys, on the keyboard, labeled **CTRL** (lower left corner) and **BOOT** (top right corner). These two keys depressed at the same time will now BOOT the system.

- Hold down the **CTRL** key while depressing the **BOOT** key.
- Disk drive A will begin to operate and its RED light will glow.

The following message will appear with a successful load:

DATAMAC COMPUTER SYSTEMS
MODEL 1255 REVXX SERXXXX
CP/M 2.2 COPYRIGHT (*)
1979 DIGITAL RESEARCH
A>

NOTE: If the above message does not appear, return to 3.2 and try again.

3.3 FORMATTING DISK

Now that you have the operating system loaded, the next step is to FORMAT a new disk in order to make duplicates or "back-up" disk of your master disk.

The diskette is divided into logical pieces called TRACKS and SECTORS. There are 40 TRACKS on each diskette, similar to the grooves on a phonograph record; however, TRACKS are concentric as opposed to spiral in placement. Each TRACK is divided into 10 SECTORS similar to pieces of a pie. Each SECTOR will hold 512 characters of users information. The DATAMAC also uses both sides of the diskette thus doubling the amount of information and requires two HEADS, one on each side of the diskette. These HEADS are referred to as HEAD 0 and HEAD 1.

In order for the computer to store and retrieve information, it must be able to locate and remember the physical TRACK and SECTOR on the diskette. The DIRECTORY is the space on the diskette where the computer keeps track of where the user information is stored on the diskette.

Formatting a disk is a simple routine FORMAT contained on the CP/M disk that writes a HEX code "E5" on both sides of the disk. It first writes on side 0 then side 1 of the disk. After it has completed its writing cycle, it then reads both sides to verify there are no bad areas or spots on the disk. The format routine insures the user that he/she is able to read and write on a disk without errors.

NOTE: Before any new disk can be used in the system, it MUST be formatted.

PROCEDURE:

- Insert CP/M disk into drive A (if not already loaded).
- Insert new disk into drive B.
- Depress **CTRL/BOOT** keys to load the operating system.

For a successful load, the following message should appear:

DATAMAC COMPUTER SYSTEM
MODEL 1255 REVXX SERXXXX
CP/M 2.2 COPYRIGHT (*)
1979 DIGITAL RESEARCH
A>

- Type in **FORMAT** -- Depress **RETURN**

The screen will display the following message:

DATAMAC DISK FORMATTER-----REL-1.0-----
SELECT TYPE OF FORMATTING DRIVE: <T>=TANDON <S>=SHUGART

NOTE: If you do not know if you have a TANDON or SHUGART drive there are two ways of finding out:

1. Open the disk drive door and look inside. Tandon drives have a white plastic spindle on the top and Shugart drives have a dark metal spindle on top.
2. If you type in a T and you have a SHUGART drive, you will not do a "read/verify" operation during the formatting function.

- Type in either a **T** or **S** (System will automatically go to the next message, DO NOT depress RETURN).

INPUT AN UPPER-CASE A,B,C OR D TO SELECT DRIVE TO FORMAT
A CARRIAGE RETURN REBOOTS THE SYSTEM !!!

- Type in an upper-case **B** -- Depress **RETURN**

The screen will display the following message:

REMOVE ALL DISKS EXCEPT THE ONE TO BE FORMATTED
IN DRIVE B AND PRESS CARRIAGE RETURN

- At the completion of the formatting condition, the following will appear on the screen:

DATAMAC DISK FORMATTER-----REL-1.0-----
SELECT TYPE OF FORMATTING DRIVE: <T>=TANDON <S>=SHUGART

- If you have no other disk to format, insert CP/M operating system back into disk drive A, close drive door and depress either the **T** or **S** key.

The following message will appear on the screen;

INPUT AN UPPER-CASE A,B,C OR D TO SELECT DRIVE TO FORMAT
A CARRIAGE RETURN REBOOTS THE SYSTEM !!!

- Depress RETURN -- The A> will appear on your screen.

NOTE: If at anytime you wish to return to the beginning of CP/M, due to confusion or entering incorrect data, depress **CTRL/BOOT**. The A> will reappear.

3.4 BACKING UP YOUR OPERATING SYSTEM

Conditions are now set to make a new operating system to be placed in a safe location for future use if necessary.

NOTE: Your CP/M operating system disk has a serial number within its program that is registered in your name. When back up duplicates are generated, your serial number will be reproduced also. Therefore, each duplicate disk must remain in your possession at all times and must not be given away or sold.

With the operating system already loaded into the system and a newly formatted disk in drive B, initiate the following procedure:

PROCEDURE:

- Type in the word **SYSGEN** -- Depress **RETURN** (the system will read the SYSGEN.COM program from disk A).

The screen will display the following message:

**SYSGEN VER 2.0
SOURCE DRIVE NAME (OR RETURN TO SKIP)**

- Type in an **A** -- Depress **RETURN**

The screen will display the following message:

SOURCE ON A, THEN TYPE RETURN

- Depress **RETURN**

The system reads the system tracks from the diskette in drive A and displays the following message:

DESTINATION DRIVE NAME (OR RETURN TO REBOOT)

- Type in a **B** -- Depress **RETURN** (The system now writes the system tracks onto the diskette in drive B)

The screen will display the following:

**FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)**

- Depress **RETURN** - system will return back to the operating system.

The data (operating system) has now been copied over onto the formatted disk in drive B. Perform the above procedure again to make a second copy of your operating system. When complete, place the master CP/M disk and its duplicate in a safe place for future use and/or backup.

DATAMAC also recommends that you copy the PIP.COM program onto your new disk. To put the PIP program onto the disk, perform the following:

- Type in the following:

PIP B:=A:PIP.COM[v - depress RETURN

- At the end of the copy, the **A>** will appear again.

3.5 CP/M DIRECTORY (DIR)

The CP/M operating system manages and tracks all of the user programs and data files. The user has the ability, via means of the DIR command and the display screen to see all of the programs and files managed by the operating system.

To view the DIRECTORY (DIR) on the screen, perform the following procedure:

PROCEDURE:

- Load CP/M operating system.
- When the **A>** appears on the screen, type in the following:

DIR-- depress **RETURN**

Upon depression of RETURN, the complete directory will appear on the screen.

The directory is written in mnemonics or abbreviations so that the system may list all of the programs and files. All programs and files that are generated by the user are assigned names with an extension mnemonic.

i.e. EXERCISE.TXT

The primary name can be up to 8 characters in length and the extension can up to 3 characters in length. The purpose of

the extension is to help the user distinguish between files that may have the same primary name.

i.e. EXERCISE.TXT and EXERCISE.BAK

The following definitions are some to the extensions that are used by CP/M that may be assigned by the user:

ASM - Assembly language file. A file entered into a macro-assembler or assembler to give the user a usable code.

TXT - A text file used in word processing, messages or documentation.

BAK - Created by the EDITOR. After a file has been created, the user must indicate to the computer that you have completed entering text. When the command is given, the system saves the original text or file, before it was changed, and replaces the existing extension TXT with BAK to indicate a "backup file". At the same time the system assigns the extension TXT to the new file.

COM - A file containing programs or commands. The result of using the LOAD program in order to make an image that can be loaded and executed from the keyboard using CP/M.

\$\$\$ - A temporary file that is automatically created by some programs that use the CP/M operating system.

3.6 COPY DISK TO DISK

In the previous text, the user was continually reminded to always backup a disk. The following procedure will enable the user to make a duplicate disk(s).

NOTE: DO NOT confuse SYSGEN with backing up a disk.

The user will now use one of the UTILITY routines offered by the CP/M operating system. The software definition of UTILITY is "a standard routine used to assist in the operation of a computer".

To copy or duplicate a disk and all of its files, perform the following procedure:

PROCEDURE:

- Load CP/M
- When A> appears, type in the following:

PIP B:=*.*[V] -- depress RETURN

As the computer is transferring files, the name and type of each will be displayed on the screen until all files have transferred.

NOTE: To copy only one of the files on the disk, replace the *.* with the file name and type

i.e. *.* EXERCISE.TXT

NOTE TO THE FIRST TIME USER:

If you have already obtained an application/utility program, read the operating instructions and become familiar with its operation.

Once you become familiar with your program, try operating it (after you have made backup copies) and you will find that you have learned more about your DATAMAC computer than you realize.

APPENDIX A

DEFINITION OF TERMS

ASCII

A standard binary coding system adopted by the computer industry for the handling and transferring of data.¹

ASYNCHRONOUS

As applied to computers, the execution of one operation is dependent on a signal that the previous operation has been completed.

BAUD

The unit of signaling speed equal to the number of code elements per second or the rate of speed at which data will be transferred from the computer to an external device (i.e. modem, printer, disk, etc.).

BIT

An abbreviation of binary digit. A single character in a binary number or a single pulse in a group of pulses.

BOOT

Short for "bootstrap" which means a technique for loading the first few instructions of a program into memory or storage; then using these instructions to bring in the rest of the program. This is accomplished by either entering a few instructions manually or a special key on the keyboard.

BYTE

A group of binary digits usually operated upon as a unit that may consist of either 6 bits to a byte or 8 bits to a byte.

CHARACTER

One symbol of a set of elementary symbols such as those corresponding to the keys on a typewriter. The symbols usually include the decimal digits 0 thru 9 and letters A thru Z, punctuation marks, operating symbols, and any other single symbol which a computer may read, store or write. Each character is either generated by a bit in the computer or a combination of bits.

COMMAND

The portion of an instruction word which specifies the operation to be performed.

CURSOR

A solid rectangular pointer, sometimes flashing, the size of a typed character that appears on the display screen. The operator may move the CURSOR up, down, left or right to indicate where the next character will be typed. The computer may also move the CURSOR to indicate either where it will place the next character or where the user is to place the character.

DUPLEX

A channel providing simultaneous transmission in both directions.

HALF DUPLEX: A type of communication channel which is capable of transmitting and receiving signals, but is not capable of simultaneous and independent transmission and reception.

FULL DUPLEX: A type of communication channel which allows the user to not only see the character entered, but will also display the same character sent back by the host computer. An indication of FULL DUPLEX is when one character is entered and two of the same character appear on the display screen.

HEX

Short for hexadecimal. A number, usually of more than one figure, representing a sum in which the quantity represented by each figure is based on a radix of sixteen.

INPUT/OUTPUT (I/O)

A general term for the equipment used to communicate with a computer and the data involved in the communication.

MODEM

An electronic device connecting a terminal/computer, via telephone line, to another terminal/computer in a distant location. A modem may be operated in either full or half duplex mode (see DUPLEX).

NULL CHARACTER

An absence of information, as contrasted with zero or blank for the presence of no information.

PARITY

A check bit that indicates whether the total number of binary "1" digits in a character or word (excluding the parity bit) is odd or even. If a "1" parity bit indicates an odd number of "1" digits, then a "0" bit indicates an even number of them. If the total number of "1" bits, including the parity bit is always even, the system is called an even parity system.

PROGRAM

The complete plan for the solution of a problem - more specifically the complete sequence of machine instructions and routines necessary to solve a problem.

ROUTINE

A set of coded instructions arranged in proper sequence to direct the computer to perform a desired operation or sequence of operations. A subdivision of a program consisting of two or more instructions that are functionally related.

SOFTWARE

A totality of programs and routines used to extend the capabilities of a computer, such as compilers, assemblers, routines and subroutines.

SYSGEN

An abbreviated name for SYSTEM GENERATION. SYSGEN is utilized to copy the system operating system (CP/M) onto a formatted disk.

APPENDIX B
HEX, DECIMAL AND ASCII CHART

ASCII CODES WITH GRAPHICS AND ATTRIBUTES
(GRAP = GRAPHICS, ATTR = ATTRIBUTES)

HEX	DECIMAL	ASCII	GRAP	ATTR	HEX	DECIMAL	ASCII	GRAP	ATTR	HEX	DECIMAL	ASCII	GRAP	ATTR
00	000	NUL			2C	044	'			57	087	W	□	
01	001	SOH			2D	045	-			58	088	X	□□	
02	002	STX			2E	046	.			59	089	Y	□□	
03	003	ETX			2F	047	/			5A	090	Z	□□	
04	004	EOT			30	048	0			5B	091	,		
05	005	ENQ			31	049	1			5C	092			
06	006	ACK			32	050	2			5D	093]		
07	007	BEL			33	051	3			5E	094	^		
08	008	BS			34	052	4			5F	095	.		
09	009	HT			35	053	5			60	096	.		HIGHLIGHT
0A	010	LF			36	054	6			61	097	a		
0B	011	VT			37	055	7			62	098	b		
0C	012	FF			38	056	8			63	099	c		
0D	013	CR			39	057	9			64	100	d		
0E	014	SO			3A	058	:			65	101	e		
0F	015	SI			3B	059	;			66	102	f		
10	016	DLE			3C	060	<	□		67	103	g		
11	017	DC1			3D	061	=			68	104	h		
12	018	DC2			3E	062	>	□		69	105	i		
13	019	DC3			3F	063	?	□		6A	106	j		
14	020	DC4			40	064	@	□		6B	107	k		
15	021	NAK			41	065	A	□	UNDERLINE	6C	108	l		
16	022	SYN			42	066	B	□	REVERSE	6D	109	m		
17	023	ETB			43	067	C	□		6E	110	n		
18	024	CAN			44	068	D	□	BLANK	6F	111	o		
19	025	EM			45	069	E	□		70	112	p		
1A	026	SUB			46	070	F	□		71	113	q		
1B	027	ESC			47	071	G	□		72	114	r		
1C	028	FS			48	072	H	□	BLINK	73	115	s		
1D	029	GS			49	073	I	□		74	116	t		
1E	030	RS			4A	074	J	□		75	117	u		
1F	031	US			4B	075	K	□		76	118	v		
20	032	SPACE			4C	076	L	□		77	119	w		
21	033	!			4D	077	M	□		78	120	x		
22	034	"			4E	078	N	□		79	121	y		
23	035	#			4F	079	O	□		7A	122	z		
24	036	\$			50	080	P	□		7B	123	{		
25	037	%			51	081	Q	□		7C	124	.		
26	038	&			52	082	R	□		7D	125	}		
27	039	,			53	083	S	□		7E	126	.		
28	040	(54	084	T	□		7F	127	DEL	▀	
29	041)			55	085	U	□						
2A	042	*			56	086	V	□						
2B	043	+												

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